

WHAT IS CLAIMED IS:

1. A light emitting device comprising:

a light emitting layer portion composed of a III-V compound semiconductor; and

a transparent thick-film semiconductor layer having a thickness of 10  $\mu\text{m}$  or more, formed on at least one main surface of the light emitting layer portion, and composed of a III-V compound semiconductor having a band gap energy larger than a light quantum energy equivalent to a peak wavelength of emission flux from the light emitting layer portion,

the transparent thick-film semiconductor layer has the side face portions configured as chemically-etched surfaces, and has a doping-controlled region having a controlled dopant concentration of  $5 \times 10^{16}/\text{cm}^3$  to  $2 \times 10^{18}/\text{cm}^3$ , both ends inclusive, formed therein to a thickness of 10  $\mu\text{m}$  or more.

2. The light emitting device as claimed in Claim 1, wherein the thickness of the transparent thick-film semiconductor layer is 40  $\mu\text{m}$  or more, and the thickness of the doping-controlled layer in the transparent thick-film semiconductor layer is 40  $\mu\text{m}$  or more.

3. The light emitting device as claimed in Claim 1 or 2, wherein the light emitting layer portion, considered as having one of two main surfaces thereof as a first main surface, has a main light extraction surface formed on the first main surface side thereof, a

light-extraction-surface-side metal electrode is disposed on the main light extraction surface so as to cover a part of thereof, and on the other hand, the transparent thick-film semiconductor layer is provided only on the second main surface side of the light emitting layer portion.

4. The light emitting device as claimed in Claim 1 or 2, wherein the transparent thick-film semiconductor layer is disposed on the first main surface side of the light emitting layer portion, and assuming the first main surface of the transparent-thick-film semiconductor layer as the main light extraction surface, the light-extraction-surface-side metal electrode is disposed so as to cover a part thereof.

5. The light emitting device as claimed in Claim 4, wherein a metal reflective layer is disposed on the second main surface side of the light emitting layer portion.

6. The light emitting device as claimed in Claim 4, wherein a first transparent thick-film semiconductor layer is provided on the first main surface side of the light emitting layer portion, and a second transparent thick-film semiconductor layer on the second main surface side thereof, respectively as the transparent thick-film semiconductor layer.

7. The light emitting device as claimed in any one of Claims 1 to 6, wherein the light emitting layer portion has a double heterostructure

composed of AlGaInP, and the transparent thick-film semiconductor layer is composed of any one of GaP, GaAsP and AlGaAs.

8. The light emitting device as claimed in any one of Claims 1 to 7, wherein the transparent thick-film semiconductor layer is epitaxially grown on the light emitting layer portion by the hydride vapor phase epitaxial growth method.

9. The light emitting device as claimed in any one of Claims 1 to 7, wherein the transparent thick-film semiconductor layer is a single-crystal substrate composed of a III-V compound semiconductor, bonded to the light emitting layer portion.

10. A method of fabricating a light emitting device comprising:  
fabricating a wafer which comprises a light emitting layer portion composed of a III-V compound semiconductor; and a transparent thick-film semiconductor layer having a thickness of 10  $\mu\text{m}$  or more, formed on at least one main surface of the light emitting layer portion, and composed of a III-V compound semiconductor having a band gap energy larger than a light quantum energy equivalent to a peak wavelength of emission flux from the light emitting layer portion; and dicing the wafer to divide it into the individual device chips;

also forming, in the transparent thick-film semiconductor layer, a doping-controlled region having a controlled dopant concentration of  $5 \times 10^{16}/\text{cm}^3$  to  $2 \times 10^{18}/\text{cm}^3$ , both ends inclusive, to a thickness of 10  $\mu\text{m}$  or

more, and removing a process-damaged layer, formed on the side face portions of the transparent thick-film semiconductor layer, by chemical etching after the dicing.

11. The method of fabricating a light emitting device as claimed in Claim 10, wherein the transparent thick-film semiconductor layer is composed of any one of GaP, GaAsP and AlGaAs, and an aqueous sulfuric acid/hydrogen peroxide solution is used as an etchant of the chemical etching.